REMARKS

As noted above, in this amendment, claims 1, 2, 6, 8, 9, 14, 16-18, 22, 24-27, 29-35, 38-40 have been amended. Claims 4, 5, 12, 13, 28, 36, 37, and 41-48 have been cancelled. Claims 49-58 have been newly added. This results in claims 1, 2, 6, 8, 9, 14-18, 22, 25-27, 29-35, 38-40, and 49-58 being under consideration. Claims 1, 9, and 17 are the independent claims drawn to a riser reactor. Claims 25 and 33 are independent claims related to processes of using the claimed riser reactors.

New claims 49-58 relate to various disclosed features of the riser reactor found in claim 1, those features being found at various places through the specification and examples. No new matter is added by these amendments.

Although a number of claims have been cancelled and amended, it is not Applicants' intention to abandon any described technology by those actions. It is Applicants' intention to retain the claims as broadly as is possible under the law.

Claim Objections

Claims 17, 28, and 33 are objected to for various wording or punctuation informalities.

Claim 33 has been cancelled and consequently any objection from informality has been obviated. As to claim 17, the words "taking place" have been changed to the suggested "takes place." In claim 28, the additional period has been deleted.

A withdrawal of the objection is requested.

Claim Rejections – 35 USC §112

Claims 2, 6, 8, and 17-48 stand rejected under 35 USC §112, second paragraph, as indefinite.

applied. The section requires that the "Examiner's focus during examination of claims for compliance with a requirement for definiteness. . . is whether the claim meets the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available." Indeed, the section requires that "the Examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 USC §112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent."

Both on the basis stated on the MPEP and upon the specific facts of the situation, Appellants' attorney objects to application of a rejection under 35 USC §112, paragraph two, on any of the instances cited in the Office Action. Indeed, it is this type of rejection that the original Commissioner's (or Director's) Notice was intended to forestall.

For instance, the Office Action notes that "said outlet zone" in a number of the depending claims is said to "lack proper positive antecedent basis" since the riser reactor set forth in the specific independent claims includes the embodiment of having no outlet zone (i.e., the zone being 'optional')." This is simply improper. There can be no question as to the scope of both the independent claim and the claims depending from those independent claims. The "outlet zone" is indeed recited as being "optional." One of ordinary skill in this art, in reading the two independent claims would understand that the "outlet zone" may be there or may not be there. For instance, in claim 2, one of ordinary skill in the art would understand whether or not the outlet zone adds to the "total height" depending whether the outlet zone is in physical existence or not. If the outlet zone has no height, then it adds nothing to the total; if the outlet zone has a height, then it adds to the "total height." Similar comments may be made about each of the dependent claims reciting an outlet zone. This rejection is improper since it does not specify how the claim is made unclear due to the presence of the word "optional" in the independent claims.

Applicants have in most instances, added the word "optional" to the words "outlet zone" to render absolute consistency between the words in the independent claim and the words in the depending claims. In other instances, Applicants have added positive recitation of the structure of

the riser reactor such that it "comprises (or comprising) said outlet zone." However, in many of these instances, the height of the outlet zone may vary from "0% to about 20% of the height of the rise reaction." Consequently, the fact that the outlet zone is optional is retained in the claims despite such amendment to the verbiage.

Again, the changes to these claims that Applicants have made are absolutely voluntary on the Applicants' part. The changes do not change the scope of the claims in any way and the changes are made in response to a rejection that is both wrong under the case law and inappropriate under the directions given to the Examining Corps by the Director and provided in MPEP 2173.02.

Similarly, the stated rejections relating to argued vagueness of depending process claims are similarly not in accord with the directions the supervising court has provided to the USPTO in dealing with the language found in the claims. Many of the rejections are but suggestions for alternative language. Suggesting a change from word "A" to word "B" is not in the nature of a rejection that is proper under this statute. A simple suggestion as to claim language more desirable to the Examiner would have been more appropriate under the MPEP. Even so, the suggestions would not have been mandatory.

Again, despite the facts that: a.) the rejection under this statute is improper and b.) were appellants to find it somehow necessary to appeal this application to the Board of Patent Appeals and Interferences, the rejection would have been overturned, Applicants have made the majority of the changes "suggested" by the Office Action.

Finally, Applicants would note that there is no "multiple claim dependency" in the claims. The process claims each depend from a single prior process claim. The Examiner is mistaken if it is thought that reciting the step of "providing the reactor system of claim 1 [or 17]" renders the claim a dependent claim. The method claims were drafted in this fashion merely to assure that no late-arriving restriction requirement between method claims and reactor claims was forthcoming.

A number of rejection statements are unclear on their face. For instance, at page 4 of the Office Action it is said that "the step of, 'providing the reactor system of claim 9'", lacks proper

antecedent basis, since "the step of, 'providing the riser reactor of claim 9'", is also set forth in claim 33. If a complete claim 34 were to be read and considered, it would be noted that claim 34 is one where a step recited in claim 33, i.e., "the step of providing the reactor system of claim 9" is further delimited in that that reactor system "provided" in the depending claim is one that is narrower in scope than the one specified in the independent claim. This is a perfectly acceptable and clear claim structure.

In any case, withdrawal of the rejection of these claims is completely appropriate and is specifically requested. Again, amendment of the claims in response to this rejection is completely voluntary and is not performed or is it necessary in overcoming this inappropriate rejection.

Claim Rejections – 35 USC §102

Cartmell

Claims 1 and 25 stand rejected under 35 USC §102(b) as anticipated by Cartmell (U.S. Pat. No. 3,785,782). The Examiner notes:

> "Cartmell (see FIGURE; column 2, lines 40-66; column 9, lines 27-40) discloses a riser reactor 10 comprising a reactor bottom and further comprising, in order from the reactor bottom,
>
> a) a prelift zone 10a having a prelift zone diameter and a prelift zone height and containing catalytic cracking catalyst (i.e., as introduced from standpipe 7);
>
> b) a first reaction zone 10b having a first reaction zone diameter and a first reaction zone height and containing catalytic cracking catalyst (i.e., from upward flow from zone 10a);
>
> c) a second reaction zone 10c having a second reaction zone height and a second reaction zone diameter that is larger than the first reaction zone 10b diameter and containing catalytic cracking catalyst (i.e., from upward flow from zone 10b); and
>
> d) an outlet zone (i.e., exit line 12, communicating with dead space 11) having an outlet zone diameter that is reduced with respect to the second reaction zone 10c diameter (see column 4, lines 17-23, see FIG.)."

Applicants disagree.

There are significant numbers of differences between the cited patent to Cartmell and the technology found in claims 1 and 25. However, Applicants wish to note one major difference between Cartmell and the claimed reactor and its corresponding method claim. Specifically, the diameter of Cartmell upper section (section 10E) is said to be 64 inches and the diameter of the bottom section (section 10A) is said to be 44 inches (see the patent at column 9, lines 27-40). The ratio of the two diameters is but 1.45. Thus, in any variation of reactor diameter ratio that one may generate from these two *in extremis* diameters and the diameters of the intervening reactor portions, none of the ratios will be equal to or exceed 1.5. Indeed, as confirmation of this point, in the single variation described in the patent, the linear velocity of the fluidized dispersion is said to be passed upwardly through the reactor "initially at a velocity of 22 feet/second" and the "velocity at the outlet from the top section approximates 22 feet/second." That is to say that the fluid velocity inside the reactor does not vary it passes up the reactor. Presumably this is so because of the added presence of product cracked molecular volumes occurring as reactions take place upon the feed. Maintenance of that linear fluid velocity vitiates against adding diameter to the reactor. A larger reactor diameter would, in the example shown and discussed at column 9, lines 18-40, tend to lower the linear velocity. Cartmell does not mention lowered linear velocity as a goal. Consequently, this reference is inadequate as a reference under 35 USC §103 as well.

Withdrawal of this rejection is entirely appropriate.

Skraba

Claims 1, 2, 17, 18, 25, 26, 41, and 42 stand rejected under 35 USC §102(b) as anticipated by Skraba (U.S. Pat. No. 4,681,743). The Examiner notes:

> "Regarding claims 1, 17, 25 and 41, Skraba (FIG. 1, 2; TABLE in column 8; column 4, line 58 to column 5, line 21) discloses a riser reactor 4 comprising, in order from the bottom,

a) a prelift zone (i.e., lift pot 37; FIG. 2) having a prelift zone diameter and a prelift zone height (see TABLE, line (50)) and containing cracking catalyst (i.e., from line 38);

b) a first reaction zone (i.e., first generally cylindrical portion 82) having a first reaction zone diameter and a first reaction zone height (see TABLE, line (4)(a)); wherein said first reaction zone 82 contains a cracking catalyst (i.e., supplied from prelift zone 37) for conducting a hydrocarbon cracking reaction (i.e., on a oil feedstock supplied by line 44);

c) a second reaction zone (i.e., second generally cylindrical portion 84) having a second reaction zone height and a second reaction zone diameter larger than the first reaction zone diameter (FIG. 1, 2 and TABLE, lines (4)(a), (c)) and containing cracking catalyst for conducting a hydrocarbon cracking reaction (i.e., supplied from the first reaction zone 82); wherein the ratio of the second reaction zone 84 diameter to the first reaction zone 82 diameter is in the range of from about 1.5:1 to about 5:1 (i.e., "...the diameter of the second generally cylindrical portion of the riser will be in the range of from *about 1.1 to about 2 times* the diameter of the riser at the mouth," column 5, lines 11-21)."

Applicants disagree.

Specifically, each of the independent claims requires first and second reaction zones resulting in a first reaction zone diameter that is between 1.1 and about 2.1 of the ratio between the first reaction zone diameter and the prelift zone diameter. Further still, the height of the first reaction zone is to be about 10% to about 30% of the height of the riser reactor. Further, the ratio of the second reaction zone diameter to the first reaction zone diameter is in a range between 1.5:1 and about 5:1 and the second reaction zone heighth falls in a range of about 30% to about 60% of the heighth of the riser reactor. The Skraba patent does not show this combination of reactor size parameters.

In particular, the portion of the Skraba reactor identified as a prelift zone the Office Action, is larger in diameter than is the first reaction zone diameter. This situation is clearly not permitted by Applicants' claims. Furthermore, it is not apparent that the "liftpot" shown in the Skraba patent is a "prelift zone" in that the head space found in Figure 2 above plug member 64 likely will be the site of some significant amount of hydrocarbon reaction. Note that Figure 3,

Figure 4, Figure 5, and Figure 6 each show variations of nozzles or the like ("means 66") used for releasing liquid oil feedstock into the riser reactor. Most of the openings in that "means 66" extend radially and consequently towards the direction of the catalyst flow past the end of plug member 64. See, for instance, column 5, lines 22-43.

As the Examiner aptly noted in a prior Office Action, where there is hydrocarbon and catalyst and the proper reaction conditions, a reaction will likely occur.

Consequently, the upper end of liftpot 37, above plug 64, may be termed a "reaction zone" in its own right.

In any case, the presence of plug 64 necessarily creates an annular volume in the region termed "chamber 78" in the Skraba device. Consequently, the concept of "diameter" as regards the dashpot has meaning only in the reaction region above the top of plug 64. The Examiner has not indicated which, if either, of these regions is to be considered the pre-lift zone. Whichever region of the "liftpot 37" is chosen, that region would not meet the terms of the claims and would be inappropriate as a pre-lift zone.

Additionally, no matter which portion is chosen by the Examiner as corresponding to the pre-lift zone or the first reaction zone or the second reaction zone, the heights of the various portions and the percentages of heights making up the total of the Skraba riser reactor are not within the same parameters required by the claims. For instance, if cylinder 82 is chosen as the first reaction zone, its 4 foot length is something less than 3% of the total 170+ feet heighth of the riser reactor. The claims require between 10 and 30% of that overall heighth.

Other physical parameters required by the claims, both independent claims and dependent claims, are further not shown in this reference.

Additionally, this reference is not suitable as a reference under 35 USC §103 under the basis used in the Office Action, i.e., that it would be obvious to optimize the various physical parameters of the reactor system, citing numerous times to the case *In re Aller,* 105 USPQ 233 and

In re Boesch, 205 USPQ 215 (CCPA 1980). These cases stand for what they say, but the Office Action overlooks the requirement that the references must supply the reader with knowledge of a specific parameter to be optimized, before one having ordinary skill in the art has the impetus to so perform such an optimization. Here, the cited documents do not provide any indication that the ratios and percentages specified in the independent claims are reactor parameters that are to be optimized. That the reference does not specify the parameter to be optimized is a fatal deficiency when applying an optimization argument to these claims. The Examiner is again urged to review *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). In that case, optimization of certain physical ratios describing a reactor configuration were found not to be "routine optimization", etc.

Applicants' request withdrawal of the rejection in that the Skraba patent does not show each limitation in the rejected claims. Withdrawal of the rejection is appropriate.

Williams

Claims 1 and 25 stand rejected under 35 USC §102(b) as being anticipated by Williams et al. (US 4,422,925). The Examiner notes:

> "Williams et al. discloses a riser reactor 2 comprising a reactor bottom and further comprising, in order from the reactor bottom,
>
> a) a prelift zone (i.e., reactor section 9) having a prelift zone diameter and a prelift zone height and containing catalytic cracking catalyst (i.e., fed from standpipe 6);
>
> b) a first reaction zone (i.e., reaction section 10) having a first reaction zone diameter and a first reaction zone height and containing cracking catalyst (i.e., fed from zone 9); and
>
> c) a second reaction zone (i.e., reaction section 11) having a second reaction zone height and a second reaction zone diameter that is larger than the first reaction zone diameter (column 3, lines 26-29; Figure) and containing catalytic cracking catalyst (i.e., fed from zone 10).
>
> Williams et al. further discloses a corresponding process of conducting a hydrocarbon cracking reaction on the flowing stream of hydrocarbons using the riser reactor 2 as disclosed, above, wherein the process comprises steps of:..."

Applicants disagree.

As a first matter, the Office Action denominates section 9 of the reactor vessel found in Williams as somehow corresponding to the pre-lift zone. Yet Williams at column 4, lines 21-29 notes that "...each of the reactor sections 9, 10, 11 and 12...". There must be a difference in function for the zone referred to in the claim to be called a pre-lift zone and a following area, volume, zone to be denoted a first reaction zone. If the reference refers to a region as a reactor, it indicates that that conduit is set up in such a way that the ancillary equipment and conduits cause it to be a reactor rather than a catalyst conduit and velocity conformer, the Office Action and the so-providing Examiner must adhere to those constraints and to those word conventions. The Applicants have chosen to denominate the pre-lift zone in such a way as to specify its purpose. That purpose provides a structure. The Williams patent has chosen similar words in those conventions, but has not denoted vessel 9 as a pre-lift zone or one having the structure and function of Applicants' pre-lift zone.

The Examiner must explain why reactor 9 in Williams is not a reactor or the rejection falls of its own weight at this early stage. Indeed, the pre-lift zone in claim 1 requires that it be such that it lifts the cracking catalyst to the first reaction zone without cracking hydrocarbons in that pre-lift zone. This is a further reason to withdraw Williams as a reference. Williams simply does not show such a "non-reaction-happening" zone. Indeed, in the drawings found in that patent, there is no region of the device that would serve to provide a "pre-lift zone height".

Furthermore, it is appropriately noted in other parts of the Office Action, the Williams et al. patent doesn't mention the diameter-ratios of the second reaction zone to the first reaction zone. Again, on this insufficiency alone, an anticipation rejection based on Williams et al. is not complete.

There are a wide number of other variations in the parameters found in these claims that press the Applicants claims very far from the limited teaching of Williams et al.

Applicants request withdrawal of the rejection of these claims over the Williams et al. patent.

Claim Rejections – 35 USC §103

Claims 2-5, 7, 17-21, 23, 26-29, 31, 41-45 and 47 are rejected under 35 USC §103(a) as being unpatentable over Williams et al. The Examiner notes:

> "Regarding claims 17 and 41, the same comments with respect to Williams et al. apply (see claims 1 and 25 above). Additionally, Williams et al. (column 4, lines 21-29) discloses that,
>
> " In each of the reactor sections 9, 10, 11, and 12, reaction conditions suitable for substantially optimum conversion of the various hydrocarbon feedstreams introduced into the successive sections of the riser reactor to the desired products may be obtained by variations in vapor velocity, catalyst loading, feed preheats, and regenerator temperature. The length and diameter of the various sections of reactor 2 are proportioned to maintain a desired reaction time in each section."
>
> • • •
>
> "However, Williams et al. is silent as to the diameter ratio of the second reaction zone 11 to the first reaction zone 10 being specifically in the range of from about 1.5:1 to about 5:1. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate diameter ratios for the second reaction zone 11 relative to the first reaction zone 10 in the riser reactor of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise diameter ratio would have been considered a result effective variable by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would hve routinely optimized the diameter of the second reaction zone 11 relative to the diameter of the first reaction zone 10 in the apparatus and process of Williams et al. in order to obtain the desired reaction conditions within each zone for achieving substantially optimum conversion of a specified hydrocarbon feedstream, *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233."

Applicants disagree.

The quotation from the Williams patent is substantially true in so far as it goes. However, it lacks several pieces of information allowing the reference to act as a substantive basis for a rejection under 35 USC §103. The cited patent does not mention the ratio of the first reaction zone diameter to the second reaction zone diameter as a result effective variable. The reference

simply mentions that, at best, the two diameters may be varied to attain a desired reaction time. However, the relationship between the lengths of the various sections of the reactor and amongst the various sections of the reactor are not mentioned at all. Only the length and diameter of an independent section is noted as being "proportioned to maintain a desired reaction time in each section." This is quite different than the ratios required in the independent claims. Indeed, the patent does not specify what any such optimization is to achieve; what does the Williams et al. reference mean when it mentions "substantially optimum conversion...to the desired products..." Is it trying to optimize production of LCCO? Iso-Alkanes? Short Chain Alkenes? It cannot be the position of the Examiner that simply any set chosen of reaction conditions provides a "substantially optimum conversion" when referring to a similarly unspecified set of "desired products." This is, or would be, an unreasonable standard with which to comply.

Furthermore, since the claims require a specific ratio of pre-lift zone diameter and first reaction zone diameter, recognizing that the pre-lift zone has no reaction taking place, how does one optimize "the length and diameter of the various sections [including reactor section 9]...are proportioned to maintain a desired reaction time in each section" when the pre-lift zone has no such reaction taking place. What is a "desired reaction time" for a conduit in which there is no reaction?

Additionally, certain other ratioed physical parameters are found in the independent claims. For instance, the claims specify that a reactor zone percentage relating to the entire riser reactor is to be maintained. Those specific ratios are not mentioned as result effective variables that ought to be optimized. Indeed, it would not be apparent from review of the Williams et al reference, what one having ordinary skill in the art would optimize and to achieve what result.

> "Regarding claims 2, 18, 26 and 42, the same comments with respect to Williams et al. apply (see claims 17, 41 and column 4, lines 21-29). However, Williams et al. is silent as to the total height of prelift zone 9, first reaction zone 10 and second reaction zone 11 being in the range of about 10 to about 60 meters (the outlet zone being optional). In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriates heights for the respective zones in the riser reactor of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise zone heights would have been considered result effective variables by one having ordinary skill in the art."

Again, the ratios required in the claims are not recognized in the Williams et al patent as being result effective variables, there is no teaching within Williams et al to what goals the parameters disclosed in Williams are to be optimized to.

The absence from Williams of a pre-lift zone having no reaction taking place therein has not been considered in the Office Action. Withdrawal of the rejection of these claims over Williams is requested.

Claims 3, 19, 27, and 43

> "Regarding claims 3, 19, 27 and 43, the same comments with respect to Williams et al. apply (see claims 17, 41 and column 4, lines 21-29). However, Williams et al. is silent as to the diameter of the prelift zone 9 being in the range of about 0.02 to about 5 meters, and the prelift zone 9 height being the range of about 5% to about 10% of the height of the riser reactor. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate dimensions for the prelift zone 9 in the riser reactor of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise dimensions would have been considered result effective variables by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the diameter and height of the prelift zone 9 relative to the dimensions of the riser reactor in the apparatus and process of Williams et al. in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feedstream."

Applicants again disagree.

There is no direction in Williams to optimize the percentages of the various sections of the Williams et al. device to those found in the claims. Indeed, again, the ratios specified by the claims are not ratios that are found in the Williams et al. patent, much less is there any direction to optimize them as ratios that provide some type of a desired result. The fact that the Office Action recites various of the components of these ratios and thereafter suggests that the ratios themselves be optimized is only evidence that the subject matter specified in the claims is not being examined. Instead, the Examiner's holdings relating to those claimed ratios is made only in hindsight after review of the Applicants' specification.

Said another way: Even if Williams were to be specific in teaching a goal to which the heighth of the various reactor sections found in Williams may be optimized, there is no suggestion that the ratio between the height of a reactor seciton and the height of the total reactor may be optimized. Again, the Office Action has misstated the parameters found in the claims and has failed to make any correspondence between the physical parameters listed in the Williams et al reference and those found in the claims. They are not the same. Furthermore, since there is no pre-lift zone in the Williams reference, optimization of the size of that zone an illusory task.

Claims 4, 20, 28, and 44

> "Regarding claim 4, 20, 28 and 44, the same comments with respect to Williams et al. apply (see claims 17, 41 and column 4, lines 21-29). However, Williams et al. is silent as to the ratio of the first reaction zone 10 diameter to the prelift zone 9 diameter being from about 1:1 to about 2:1, and the height of the first reaction zone 10 being from about 10% to about 30% of the height of the riser reactor 2. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate dimensions for the first reaction zone 10 in the riser reactor of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise dimensions would have been considered result effective variables by one having ordinary skill in the art."

Applicants again disagree.

The portion of the reactor denominated number 9 in the Williams patent drawing is, again, a portion of the disclosed device that is somehow adapted to carry out a hydrocarbon reaction of some type. Consequently, it is not the "pre-lift zone" required by the claims. Consequently, any attempt to compare a heighth, volume, width, diameter, or overall ratio of a pre-lift zone found in Williams et al. to the heighth of the overall reactor system is folly. There is no pre-lift zone shown in Williams. Consequently, this rejection is not based upon the evidentiary support needed for affirmance in a higher tribunal and should be simply withdrawn.

Applicants request that the rejection of these claims be withdrawn.

Claims 5, 21, 29, and 45

"Regarding claims 5, 21, 29 and 45, the same comments with respect to Williams et al. apply (see claims 17, 41 and column 4, lines 21-29). However, Williams et al. is silent as to the ratio of the second reaction zone 11 diameter to the first reaction zone 10 diameter being in the range of from about 1.5:1 to about 5:1, and the height of the second reaction zone 11 being in the range of from about 30% to about 60% of the height of the riser reactor 2. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate dimensions for the second reaction zone 11 in the riser reactor of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise dimensions would have been considered result effective variables by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the diameter of the second reaction zone 11 relative to the diameter of the first reaction zone 10, and the height of the second reaction zone 11 relative to the height of the riser reactor 2, in the apparatus and process of Williams et al., in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feedstream."

Applicants disagree.

Again, the Office Action has misidentified the variables recited in the claims. Optimizing a diameter is not the same as optimizing the ratio of two diameters.

Again, withdrawal of the rejection is appropriate and is specifically requested.

Claims 7, 23, 31, and 47

"Regarding claims 7, 23, 31 and 47, the same comments with respect to Williams et al. apply (see claims 17, 41 and column 4, lines 21-29). Williams et al. further illustrates a first junction section (not labeled, see Figure) located between the first reaction zone 10 and the second reaction zone 11, wherein the first junction section has a circular truncated cone shape. However, Williams et al. is silent as to the first junction sectio defining a vertical section vertex angle with respect to the reactor axis in the range of about 30 to 80 degrees. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate vertex angle for the first junction section in the apparatus and process of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise angle would have been considered result effective variable by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the vertex angle of the first junction section relative to the dimensions of the first and second reaction zones 10, 11 in

the apparatus and process of Williams et al., in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feedstream."

Applicants disagree.

The Office Action has stretched the amount of disclosure found in the Williams patent to an extreme. There is no mention of creating a conical region between the reactor sections shown in Williams et al. Consequently, there is no teaching to optimize the angle of a conical section found between two reactor sections. These junctions between reactor sections are not within the section cited by the Examiner as being "proportioned to maintain a desired reaction time in each section." There is no indication that such an angle is a "result-effective parameter."

The drawing is cited as a source of an implication that the reactor sections, 9, 10, 11, and 12 are joined in a cone-shaped joint. As is well known in these engineering construction arts, it is a common practice to slide a smaller conduit within the diameter of a larger conduit and then to provide a conical weld on the exterior merging surfaces. This apparent cone is seen only on the exterior of the reactor or conduit line and is not to be seen on the interior surface. Since the parameter is not suggested within the patent as being one that as a result, effective parameter and indeed is not mentioned at all by the patent, and there are other explanations for the lines as shown in a drawing, this rejection is wholly outside of the realm of a proper rejection under 35 USC §103.

Withdrawal of the rejection is requested.

Williams et al in view of Myers et al

Claims 6, 8-16, 22, 24, 30, 32-40, 46, and 48

Claims 6, 8-16, 22, 24, 30, 32-40, 46 and 48 stand rejected under 35 USC §103(a) as unpatentable over Williams et al in view of Myers et al. (US 4,070,159).

"Regarding claims 9 and 33, the same comments with respect to Williams et al. apply (see claims 1 and 25 above). Williams et al. further discloses that the hydrocarbon cracking reaction occurs at a higher reaction temperature and higher ratio of catalyst to oil in

the first reaction zone 10 than the second reaction zone 11 (i.e., "The temperature and catalyst-to-oil ratio decrease progressively in subsequent sections of the reactor as the heavier hydrocarbon charge stocks are introduced into the reactor," column 2, lines 40-45).

• • •

"In each of the reactor sections 9, 10, 11 and 12, reaction conditions suitable for substantially optimum conversion of the various hydrocarbon feedstreams introduced into the successive sections of the riser reactor to the desired products may be obtained by variations in vapor velocity, catalyst loading, feed preheats, and regenerator temperature. The length and diameter of the various sections of reactor 2 are proportioned to maintain a desired reaction time in each section."

• • •

"However, Williams et al. is silent as to the length and diameter of the first reaction zone 10 being proportioned relative to the length and diameter of the second reaction zone 11 such that the first reaction zone 10 has a shorter reaction time than the second reaction zone 11. In any event, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select appropriate dimensions for the first reaction zone 10 relative to the second reaction zone 11 in the riser reactor of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise dimensions would have been considered result effective variables by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the diameter and height of the first reaction zone 10 relative to the diameter and height of the second reaction zone 11 in the apparatus and process of Williams et al., in order to obtain the desired reaction conditions and reaction time within the respective zones for achieving substantially optimum conversion of a specified hydrocarbon feedstream."

• • •

"Williams et al. further discloses the riser reactor 2 comprises an outlet zone (i.e., as illustrated in the Figure, the discharge end of zone 12 of riser 2, communicating with cyclone separator 13; column 4, lines 30-33), wherein the process additionally comprises the steps of passing the second reaction zone stream from the second reaction zone 11 to the outlet zone. However, Williams et al. is silent as to the outlet zone being configured with a reduced outlet zone diameter with respect to the second reaction zone 11 diameter."

• • •

"Myers et al. teaches a riser reactor comprising a riser tube 10 having a discharge end comprising a conical neck or restrictor section in the riser, as indicated by the step-down section at 32 in FIG. 3, situated just upstream of sidewise ports 17 of lateral conduit 18. It would have been obvious for one of ordinary skill in the art at the time the invention was

made to modify the outlet zone of the riser reactor 2 in the apparatus and process of Williams et al. as instantly recited, on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the provision of a restricted section, which increases the transport velocity of the product stream at the discharge end of the riser, enchances the separation of catalyst particles from the gas stream, as taught by Meyers et al. (see column 4, lines 20-31; FIG.3)."

Relating to claims 9 and 33, Myers does not remedy the fact that the primary reference does not teach consideration of the ratios of the diameters of the first reaction zone to the pre-lift zone and the ratio of the diameter of the second reaction zone to the first reaction zone. Neither Myers nor Williams discusses the use of a pre-lift zone. Consequently, there is no consideration of and can be no consideration of the ratios of the two zones (first reaction and pre-lift) in the patents as "result effective variables."

Additionally, Myers suggests that there are but two riser tube configurations to be utilized in the method and apparatus described in the Myers patent. Specifically, as noted in the areas cited by the Examiner Office Action, Myers at column 3, lines 14-45 specifically mentions that the "riser tube 10 can be of uniform diameter throughout its length as shown in Figure 1 or have a tapered section disposed at the upstream end portion thereof as shown in Figure 2...in hydrocarbon conversion operations of the type herein mentioned, the tapered section extends for about a third of the overall length of the riser tube."

Consequently, the single reaction zone specified in Myers is not of the same type that is required in the Williams reference. There is no teaching in the Myers referenc to apply such a reactor modification to the multi-stage reactor shown in the Williams patent. Absent such teaching, the only reason that one having ordinary skill in the art would combine the components found in the two patents is found in the description provided by the Applicants. This, of course, is not allowed. Withdrawal of the rejection is completely appropriate.

Claims 6, 14, 22, 30, 38, and 46

"Regarding claims 6, 14, 22, 30, 38 and 46, the same comments with respect to Williams et al. and Meyers et al. apply. However, their collective teachings are expressly silent as to the ratio of the outlet zone diameter to the first reaction zone 10 diameter being

in the range of from about 0.8:1 to about 1.5:1, and the height of the outlet zone being from about 0% to about 20% of the height of the riser reactor 2. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate outlet zone diameter relative to the first reaction zone 10 diameter, and an appropriate height of the outlet zone relative to the height of the riser reactor 2, in the modified apparatus and process of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise dimensions for the outlet zone would have been considered result effective variables by one having ordinary skill in the art. Accordingly, one having ordinary skill in the art would have routinely optimized the diameter of the outlet zone in proportion to the height of the riser reactor 2, in the modified apparatus and process of Williams et al., in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feestream."

Applicants disagree. The Myers patent shows a zone of reduced diameter on the upper end of a catalytic cracking unit's riser reactor. There can be little question, but that the Myers device discloses but a single reactor zone. The Williams reference, on the other hand, utilizes no such outlet zone and includes multiple reaction zones.

It is extremely unclear why one having ordinary skill in the art would select the diameter of the outlet zone of Myers and somehow optimize it or, even correlate it, to the diameter of the first reaction zone found in the Williams reactor. There is no reason stated in the Office Action as to why that worker of ordinary skill would even consider the limitation much less set a range for it. Again, this is especially true, in that these two references, because of their widely differing reactor designs, are not appropriately combined as prior art references to teach the result relied upon by the Office Action.

Withdrawal of this rejection is therefore requested.

Claims 8, 16, 24, 32, 40, and 48

"Regarding claims 8, 16, 24, 32, 40 and 48, Meyers et al. teaches that the step-down section at 32 (FIG. 3) comprises a circular truncated cone shape, wherein section 32 inherently defines a second junction section between the second reaction zone 11 and the outlet zone in the modified apparatus of Williams et al. The collective teaching, however, is silent as to the cone having a vertical section vertex angle with respect to the reactor axis in the range of about 45 to 85 degrees. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate vertex

angel for the second junction section in the modified apparatus and process of Williams et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the precise angle would have been considered result effective variable by one having ordinary skill in the art. Thus, one having ordinary skill in the art would have routinely optimized the vertex angle of the second junction section relative to the dimensions of the first and second reaction zones 10, 11 in the apparatus and process of Williams et al., in order to obtain the desired reaction conditions and reaction time within the system for achieving substantially optimum conversion of a specified hydrocarbon feedstream."

Applicants disagree. The Office Action truly provides a unique and original view of the device shown in the Myers patent. As best as is understood, the Office Action suggests that the "disengaging vessel 11" constitutes the second reaction zone. For consistency, then, this means that the Office Action considers the riser reactor 10 to be the first reaction zone. This is consistent with the explanation provided with regard to claim 6, 14, 22, 30, 38, and 46 expressed above, but in doing so ignores the requirements of the various claims. Specifically, each of the independent claims, from which the claims under discussion depend, requires that the riser reactor "comprises a reactor bottom and further comprises in order from that reactor bottom" before specified zones. If Myers includes an outlet zone that is situated between a first reaction zone (riser reactor 10) and a second reaction zone (disengaging vessel 11), then the Myers reference is even more irrelevant to the claimed reactors in which the outlet zone must be physically above the second reaction zone.

Additionally, assuming for the sake of argument only, that the disengagement vessel 11 found in Myers is to be considered a second reaction zone, it is certainly unclear how the tapered upper end of Myers' riser tube 10 joins to the vessel specified (disengagement vessel 11) as shown in Figure 3 of the Myers patent.

Further, it is to be noted that the Office Action appears to be suggesting that the step-down section or conical section found at 32 on the top of Myers' riser reactor 10 is somehow forming -- at the same time in the rejection -- both the junction between the first and second reaction zones AND the junction between the second reaction zone and the outlet zone. This portion of the rejection is quite confusing and appears to be proceeding on two different and logically inconsistent bases. One in which the riser reactor (10 in Myers) is somehow modified to be the multiple-

diameter-reactor found in the Williams patent and one in which the second reaction zone is made up of Myers disengagement vessel 11.

Either basis is erroneous for the reasons discussed above. The mere fact that the Office Action modifies the two references in two different ways in the same rejection is certainly strong proof that the inconsistent logic found in the rejection is not appropriate in either case and certainly doesn't lead one of ordinary skill in the art to a single conclusion after even a selected reading of the two patents.

Withdrawal of the rejection is requested.

These comments are similarly applicable to the summary rejections stated relating to claims 10-13, 15, 34-37, and 39.

CONCLUSION

Each of the presently pending claims is in condition for immediate allowance. Such allowance is requested. If a telephone conference would expedite the prosecution of this application, the Examiner is urged and invited to telephone the Applicants' attorney at the number given below.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 456962000200. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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